A Comprehensive Approach to Cancer Prevention and Control: A Vision for the Future

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Introduction

The Centers for Disease Control and Prevention (CDC) defines comprehensive cancer control as "an integrated and coordinated approach to reducing cancer incidence, morbidity, and mortality through prevention, early detection, treatment, rehabilitation, and palliation" (www.cdc.gov/cancer/nccp/index.htm). This comprehensive approach is based on the premise that effective cancer control planning and programming should address a continuum of services, from primary prevention and early detection through effective treatment, quality care, and end-of-life services such as pain relief.

CDC is encouraging state, territorial, and tribal health agencies to adopt cancer control programs that are "comprehensive" in several other senses as well. They should be comprehensive in the functions they incorporate (e.g., basic and applied research, surveillance, clinical services, health communications). They should also comprehensively address all major types of cancer and the needs of all population groups, while giving special emphasis to the needs of groups disproportionately affected by cancer. Finally, they should be comprehensive in recruiting a wide base of partners and in coordinating the efforts of these partners in developing and implementing a cancer prevention and control plan that all stakeholders can embrace.

Health departments can expect to face numerous issues as they work to develop comprehensive cancer control programs. These include

- Establishing an effective infrastructure (i.e., administrative and organizational systems).
- Obtaining adequate resources (e.g., staff, funding) for cancer control.
- Accessing sufficient cancer data (e.g., incidence data, treatment data) to make informed program decisions.
- Coordinating cancer control efforts.
- Reducing racial and ethnic disparities in cancer burden and in access to appropriate treatment.
- Conducting ongoing evaluations of program effectiveness.

Cancer Burden

The American Cancer Society (ACS) estimates that, in 2003, more than 556,500 Americans will die of cancer—more than 1,500 people every day—and that about 1,334,100 new cases of cancer will be diagnosed.[1] These estimates do not include carcinoma in situ (except urinary bladder) or basal and squamous cell skin cancers. Cancer is the second leading cause of death in the United States, accounting for one of four deaths. From 1950 to 1991, cancer death rates increased steadily. Rates began to decline in 1991, largely because of a decline in rates of lung cancer deaths.[2] However, the aging and increasing size of the U.S. population will cause the total number of cancer cases to double by 2050 if current incidence rates remain steady.[3]

The National Cancer Institute (NCI) estimates that almost nine million Americans with a history of cancer were living in 1997; some were under treatment and some were considered cured.[4] The combined 5-year survival rate for Americans with any type of cancer is 62%.[1]

Table 1. Statistics for Selected Cancers

Cancer Type (ICD-9*)	No. of New Cases (est. for 2003)	No. of Deaths (est. for 2003)	Five-Year Survival Rate (%)
All sites (140–239)	1,334,100	556,500	62
Breast (174)	212,600	40,200	97 (localized)
Prostate	220,900	28,900	97
Lung (162)	171,900	157,200	15
Colon (153) and rectum (154)	147,500	57,100	62

*ICD-9 = *International Classification of Disease*, 9th Revision.
Source: American Cancer Society, *Cancer Facts and Figures, 2003* (Ref. 1).

The ACS estimates that cancers that can be detected by screening account for about half of all new cancer cases. If all these cancers were detected at a localized stage through appropriate screening, the 5-year survival rate would approach 95%.[1] For these reasons, the bulk of cancer prevention and control research dollars are dedicated to the prevention and early detection of these cancers.

African Americans have higher rates of many cancers than other racial or ethnic groups. During 1992–1999, the overall cancer incidence rate per 100,000 persons was 526.6 among African Americans, 480.4 among whites, 329.6 among Hispanics, 348.6 among Asian/Pacific Islanders, and 244.6 among American Indians/Alaska Natives. Racial disparities in outcomes are often even more pronounced than disparities in incidence rates. For example, although breast cancer is diagnosed more often in white women, African American women are more likely to die of the disease. The overall cancer mortality rate is also about one-third higher among African Americans than among whites.[1]

Mortality rates also vary by gender. The most recent age-adjusted annual cancer death rates were 259.1 for U.S. men and 171.4 for U.S. women.[3]

Cancer's financial costs are significant. The National Institutes of Health estimates that cancers cost the nation more than $171.6 billion in 2002: $60.9 billion in direct medical costs (i.e., expenditures for medical procedures and services associated with treatment and care for cancer), $15.5 billion in indirect morbidity costs (such as the value of work disability and absenteeism associated with cancer), and $95.2 billion for indirect mortality costs (such as the cost of lost productivity due to premature death). More than half of all medical costs for cancer are estimated to be for the treatment of breast, lung, prostate, and colorectal cancers,[4] again underscoring the importance of directing prevention and early detection activities toward these cancers.

The nonmonetary costs of cancer are also substantial but cannot be adequately quantified. Cancer pain, though usually manageable, can be a significant

problem, as can the discomfort of treatment and damage to the cancer patient's self-image. After treatment for cancer, many people can continue an active, vital life—but they must live with the fear and uncertainty that the cancer might return. As one cancer survivor commented, "the fear for me now, eight and a half years out from my diagnosis, is generally background noise. Most of the time I am not aware of it, yet it waits ready to pounce at the slightest provocation."[5] Because between eight and nine million Americans have a history of cancer, the toll of the disease is enormous no matter how the burden is calculated.

Healthy People 2010 Cancer Objectives

Healthy People (HP) 2010,[6] which defines the nation's long-term health objectives, contains 15 health objectives in a chapter focusing on cancer and additional related objectives in chapters on nutrition, oral health, and tobacco. The overarching goal of these objectives is to reduce the overall burden of cancer and to eliminate racial and ethnic disparities in cancer morbidity and mortality rates.

Specific *HP 2010* cancer objectives include the following:

- Reduce the overall cancer death rate per 100,000 population from 202.4 cancer deaths in 1998 to 159.9, as well as reduce mortality rates from the following specific cancers:
- Lung (to 45 deaths per 100,000).
- Breast (to 22 deaths per 100,000).
- Cervix (to 2 deaths per 100,000 women).
- Colon/rectum (to 14 deaths per 100,000).
- Oropharynx (to 3 deaths per 100,000).
- Prostate (to 29 deaths per 100,000 men).
- Melanoma (to 3 deaths per 100,000).
- Increase the proportion of people who use at least one of the following protective measures to reduce sun exposure and skin cancer risk:
- Avoid the sun between 10 a.m. and 4 p.m.
- Wear sun-protective clothing when exposed to sunlight.
- Use sunscreen with a sun protection factor (SPF) of 15 or higher.
- Avoid artificial sources of ultraviolet light.
- Increase the proportion of physicians and dentists who counsel their patients at high risk for cancer about the importance of giving up tobacco use, increasing physical activity, and having the appropriate cancer screening tests.
- Increase the proportion of women 18 years of age or older who receive Papanicolaou (Pap) tests:
  - Increase the proportion who have ever received a Pap test to 97%.
  - Increase the proportion who have received a Pap test within the preceding 3 years to 90%.
- Increase the proportion of adults 50 years of age or older who receive colorectal cancer screening examinations:
  - Increase the proportion who have received a fecal occult blood test within the preceding 2 years to 50%.
  - Increase the proportion who have ever received a sigmoidoscopy to 50%.
- Increase the proportion of women 40 years of age or older who have received a mammogram within the preceding 2 years to 70%.
- Increase to 45 the number of states that have a statewide population-based cancer registry that captures case information on at least 95% of the expected number of reportable cancers.
- Increase the proportion of people with cancer who live 5 years or longer after diagnosis to 70%.

All cancer prevention and control programs are encouraged to incorporate the goals of *HP 2010* into their program activities.

Public Health Opportunities in Cancer Control

Primary, Secondary, and Tertiary Prevention

Many factors that contribute to cancer deaths are preventable. It has been estimated that from 50% to 70% of cancer deaths are attributable to preventable risk behaviors;[7] 30% of cancer deaths can be attributed to tobacco use and more than 30% to

poor nutrition.[8] Obviously, the public health community needs to focus on such preventable risk factors.

Cancer prevention can be divided into three stages: primary, secondary, and tertiary. *Primary prevention* refers to the complete prevention of disease, often through methods that inhibit exposure to risk factors. The four most important risk factors for cancer are tobacco use, lack of physical activity, exposure to ultraviolet light, and poor nutrition. Primary prevention is often used synonymously with prevention.

Secondary prevention activities detect disease early and limit disease effects after diagnosis. Outcomes for patients with breast cancer, for example, can be dramatically improved through early detection followed by appropriate treatment.

Tertiary prevention involves preventing further disability and restoring a higher level of functioning in someone with a disease. Like secondary prevention, tertiary prevention can involve treatment; however, it also includes rehabilitation and pain control. Even though cancer pain can be relieved through proper therapies, the National Cancer Institute suggests that the undertreatment of pain is a serious and neglected public health problem.[9] To help alleviate this problem, public health organizations should work with medical partners to ensure that cancer patients receive effective pain relief.

Although tertiary prevention of cancer is not often an emphasis of public health, local programs that are adopting a comprehensive cancer approach need to work with partners to ensure that patients with cancer receive appropriate tertiary care. Prevention opportunities offered through a particular intervention will vary depending on the risk factor or stage of disease at which the intervention is directed and the type of cancer being addressed.

Essential Strategies and Interventions

Programmatic Interventions

Cancer prevention and control interventions can be directed at individuals, at health care providers or systems, or at organizations such as religious institutions or employers. Rates of cancer-related illness and death can be lowered by increasing public awareness about cancer and its risk factors, promoting behavior that decreases people's cancer risk, and providing people with better access to cancer-related health care services.

Environmental and policy actions affect communities, work places, homes, and schools, influencing lifestyle choices that people make. Environmental factors, defined broadly to include smoking, diet, and infectious disease, as well as some chemicals and radiation, are associated with perhaps three-quarters of all cancer deaths in the United States.[1] Strong regulatory controls and promotion of safe occupational practices, in combination with healthier individual lifestyle choices, can be effective in reducing cancer incidence and mortality rates. Policy and environmental interventions specific to cancer risk factors, such as those that encourage physical activity, good nutritional choices, or tobacco use cessation, are especially useful in supporting behavioral change among individuals. (See Chapter 7 on physical activity and nutrition and Chapter 8 on tobacco use.)

Interventions important for the prevention and early detection of cancer include those designed to reduce the prevalence of smoking, reduce people's consumption of fat and increase their consumption of fiber, increase people's level of physical activity, increase the percentage of women who undergo regular breast cancer screening and Pap testing, increase the proportion of the population over 50 years of age who are screened for colorectal cancer, decrease people's level of ultraviolet radiation exposure, and encourage the use of appropriate state-of-the-art cancer treatment.

In The *Guide to Community Preventive Services* (also called The *Community Guide*; available at www.thecommunityguide.org), the Task Force on Community Preventive Services recommends specific evidence-based interventions for promoting breast, cervical, and colorectal cancer screening; preventing sun exposure and promoting skin protection; and helping people make informed decisions about screening for cancers. It also identifies areas for future prevention research and programming and includes chapters related to tobacco control and physical activity. When choosing or designing interventions, decision-makers should consider these evidence-based recommendations as they examine their own needs, goals, resources, and constraints.

The North Carolina example below provides a clear model for how individual site-specific and risk-factor-specific interventions can be coordinated within a framework that integrates surveillance, communications, policy, and evaluation. Currently, interventions implemented through cancer prevention and control programs often overlap with those implemented through other programs. A comprehensive cancer control approach would foster collaboration among such overlapping programs and, as a result, potentially provide more effective interventions at a lower cost.

Comprehensive Cancer Control Programs in Action—North Carolina: Since it first received CDC funding for comprehensive cancer control in 1998, North Carolina has expanded its planning and coordination efforts, developed and implemented the statewide "Nutrition Challenge" campaign, created professional education resources to promote colorectal cancer screening, developed a campaign to inform people about clinical trials for cancer prevention and control, enhanced its youth tobacco control efforts, and designed a comprehensive evaluation plan. These activities were selected as funding priorities by the North Carolina Advisory Committee on Cancer Coordination and Control. (www.nccancer.org/ccplan06.htm)

Using Data and Research Results to Design Interventions

Accurate and complete data and solid research form the underpinnings for comprehensive cancer control. They help planners to understand the extent of the cancer burden and the existing infrastructure to address that burden. Data and research help ensure that politically popular strategies are also sound.

Because a major goal of public health is to translate research into effective practice, partners should be encouraged to participate in the data review process, reviewing data that document the burden of cancer and its costs in human and monetary terms.

Information useful in assessing and addressing (through interventions) cancer burden include data derived from basic and applied research; data on the relevance, efficacy, and cost-effectiveness of possible intervention strategies; and data on the existing or developing capacity to implement effective interventions. Such data should help public health officials select relevant and affordable intervention strategies that they can tailor to priority populations and implement successfully. When incorporated into an organization's comprehensive cancer control plan, these strategies will provide all stakeholders with a blueprint for action to address the cancer burden.

Comprehensive Cancer Control Programs in Action—West Virginia: In addition to using data from the Cancer Registry and the Behavioral Risk Factor Surveillance System, West Virginia's Comprehensive Cancer Control Coalition has used the nationwide oncology outcomes database of the American College of Surgeons to describe patient-care patterns and has used evaluation studies and marketing data (such as the NCI Consumer Health Profiles) to help plan intervention programs. (www.cdc.gov/cancer/ncccp/contacts/wv.htm)

Comprehensive Cancer Control Programs in Action—Illinois: To select priorities for its comprehensive cancer plan, the Illinois state health department and its cancer control partners created several work groups. These work groups submitted priorities for their respective areas to the partnership. These were collapsed into six overarching priorities for the state cancer plan. For each priority, one or more related strategies, each involving multiple recommended activities, were approved by the partnership. (www.cdc.gov/cancer/ncccp/contacts/il.htm)

Evaluation data, the means by which the effectiveness of programs are measured, provide feedback for ongoing refinement of the program planning and implementation process. Core evaluation activities include surveillance (i.e., identifying and monitoring cancer and risk factor trends in the general population and cancer-burden disparities among groups of people) and the collection of data measuring the process and outcomes of program activities.

A comprehensive cancer control plan should be reviewed on a specified, routine basis to determine whether its objectives are being met and whether program activities should be redirected. Supervising officials should ensure that evaluation activities are useful, feasible, accurate, and ethical. A detailed discussion of how to conduct program evaluations can be found in "Framework for program evaluation in public health."[10] This document can be accessed at www.cdc.gov/eval/framework.htm.

Opportunities for the Prevention and Control of Selected Cancers

Five cancers have been chosen for discussion because of 1) their importance in new cancer cases and cancer deaths (breast, colorectal, and prostate), 2) the ability to detect them early through screening (breast, cervical, and colorectal), 3) their increasing prevalence (melanoma), and 4) their potential for 5-year survival with early diagnosis (cervical and prostate).

Breast Cancer Interventions

Breast cancer is the most common type of nondermatologic cancer among women in the United States. Because opportunities for the primary prevention of breast cancer are limited, we encourage public health practitioners to focus on secondary prevention (i.e., on early detection and appropriate treatment). Regular use of screening mammograms can help reduce the risk of dying of breast cancer. For women aged 50–69, strong evidence indicates that screening lowers this risk by 30%. For women in their 40s, the risk can be reduced by about 17%.[7] The 5-year survival rate for women with localized, early-stage breast cancer is excellent—97%.[1]

A number of states have state- and CDC-funded programs to encourage breast cancer screening. An example of a nationwide program is the CDC-funded National Breast and Cervical Cancer Early Detection Program (NBCCEDP; information is available at www.cdc.gov/cancer/nbccedp/index.htm). Through this program, CDC and its partners in state, tribal, and territorial health agencies provide low-income, uninsured, or underinsured women free or low-cost breast and cervical cancer screening. The program operates in all 50 states, the District of Columbia, 6 U.S. territories, and 14 American Indian/Alaska Native tribal organizations.

Comprehensive Cancer Control Programs in Action—Nebraska: To help ensure diagnosis and treatment for women with breast or cervical cancer, Nebraska's Every Woman Matters program collaborates with the Junior League of Omaha and the Susan G. Komen Foundation to sponsor the annual Race for the Cure and associated activities, with the proceeds going to the program. The Breast and Cervical Cancer Advisory Committee also does fundraising, and providers throughout the state have donated their services to women who could not otherwise afford screening. (www.cdc.gov/cancer/ncccp/contacts/ne.htm)

Cancer support groups, such as the American Cancer Society's Reach to Recovery program, are often a valuable resource for women being treated for breast cancer, as well as for their families and friends.

Cervical Cancer Interventions

Cervical cancer is not common in the United States. Although the incidence rate has leveled off in the last few years, until then incidence and mortality rates had both decreased steadily for 50 years. A major reason for these decreases is the widespread use of screening for cervical cancer with the Pap test. As a result, preinvasive lesions of the cervix are detected more frequently than invasive cancer.[1]

The annual cervical cancer incidence rate among African American women is still substantially higher than that among white women (13.9 versus 8.8 per 100,000 in 1999).[11] Health officials should institute screening programs and, to reduce this disparity, behavioral change interventions that target underserved African American populations. Behaviors to be promoted include limiting one's number of sex partners, delaying sexual intercourse, using condoms, and avoiding tobacco products.

Cervical cancer screening is often offered through programs that provide both breast and cervical cancer education and screening services. The CDC-funded NBCCEDP discussed in the previous section is an example of a nationwide screening program that addresses cervical cancer. A goal of the NBCCEDP is to identify those women who have not had a Pap test in at least 5 years. Sixty percent of women diagnosed with cervical cancer are in this group, and many of them have a poor prognosis; however, women whose cervical cancer is diagnosed and treated early have a 5-year survival rate of 92%.[1]

Colorectal Cancer Interventions

Colorectal cancer is the second most common nondermatologic cancer in the United States. Definite risk factors for colorectal cancer include a personal or family history of colorectal cancer, colon polyps, or inflammatory bowel disease. Other potential risk factors include smoking, physical inactivity, a high-fat and/or low-fiber diet, alcohol consumption, and low intake of fruits and vegetables.

The number of deaths from colorectal cancer and the incidence of the disease can both be reduced by detecting and removing precancerous polyps and by detecting and treating the cancer in its early stages. Precancerous polyps can be present in the colon for years before invasive cancer develops. The 5-year survival rate for patients with colorectal cancer (all stages) is 62%.[1]

One way to promote colorectal cancer screening nationwide is by educating health care providers and the public about the benefits of screening, the availability of screening procedures, and current screening guidelines. CDC contributes to this educational process through its Screen for Life—the National Colorectal Cancer Action Campaign (www.cdc.gov/cancer/screenforlife/index.htm), and the National Colorectal Cancer Roundtable (www.cdc.gov/cancer/partners/fp–nccr.htm).

Prostate Cancer Interventions

Other than skin cancer, prostate cancer is the most commonly diagnosed form of cancer among men in the United States and is second only to lung cancer as a cause of cancer-related death among men. Age, race, ethnicity, and family history are all significantly associated with risk for prostate cancer. The incidence of prostate cancer is substantially higher among African American men than among white men (229.3 versus 152.3 per 100,000 in 1999).[11]

Medical and public health experts agree that every man needs balanced information on the pros and cons of prostate cancer screening to help him make an informed decision. Balanced information is important because medical experts disagree about whether men should be screened regularly for prostate cancer.

Those who encourage regular screening believe current scientific evidence shows that finding and treating prostate cancer early, when treatment might

be more effective, may save lives. They recommend that all men who have a life expectancy of at least 10 years should be offered the prostate-specific antigen blood test and digital rectal examination annually beginning at age 50. They also recommend offering screening tests earlier to men at higher risk for prostate cancer, specifically African American men and men who have a father or brother with prostate cancer. They do not recommend routine screening, but instead using a form of shared decision-making.

Those who do not recommend regular screening want convincing evidence that finding early-stage prostate cancer and treating it is beneficial. They believe that some of these cancers detected by screening may never affect a man's health and that treating them could cause temporary or long-lasting side effects such as impotence and incontinence. Because they believe it is unclear if the potential benefits of screening outweigh the known side effects of screening and treatment, they recommend that all men be given information on the pros and cons of screening before making their own screening decision.

Results from clinical trials that are currently underway are expected in 5 to 10 years, and these results will help to clarify guidance about prostate screening. Currently, CDC encourages each man to make his own decision about prostate cancer screening in consultation with his physician. This decision should be based on an understanding of his own risk factors and the risks and benefits of screening and the alternatives. CDC and a number of state and academic partners are conducting research and developing educational materials to promote informed decision making for prostate cancer screening.

Skin Cancer Interventions

Among Americans, more than 1 million cases of the highly curable basal cell or squamous cell cancers are diagnosed each year. The American Cancer Society estimates that melanoma, the most serious form of skin cancer, will be diagnosed in over 54,000 people in 2003.[1] However, even melanoma is treatable if detected early: the 5-year survival rate of patients with localized melanoma is 96%.[1]

Risk factors for skin cancer include excessive exposure to ultraviolet radiation, fair complexion, occupational exposure to certain chemicals, a family history of skin cancer, and multiple or atypical moles. Strategies to help prevent skin cancer include limiting or avoiding exposure to the sun during the midday hours, covering the skin when outdoors, and using a sunscreen with a sun protection factor (SPF) of 15 or greater. Because of the possible link between severe sunburns during childhood and risk for melanoma in later life, children, in particular, should be encouraged to avoid excessive sun exposure.

CDC, in conjunction with national partners such as the Federal Council on Skin Cancer Prevention and the National Council on Skin Cancer Prevention, has developed epidemiological research and monitoring systems to determine national trends in sun protection behaviors and attitudes about sun exposure. The CDC-funded Skin Cancer Primary Prevention Education Initiatives are an example of a nationwide program to address sun safety. In 1998, CDC launched its national skin cancer prevention campaign, Choose Your Cover, designed to promote sun protection behaviors (www.cdc.gov/ChooseYourCover). Other skin cancer prevention activities include supporting intervention demonstration projects and developing guidelines for skin cancer education in schools.

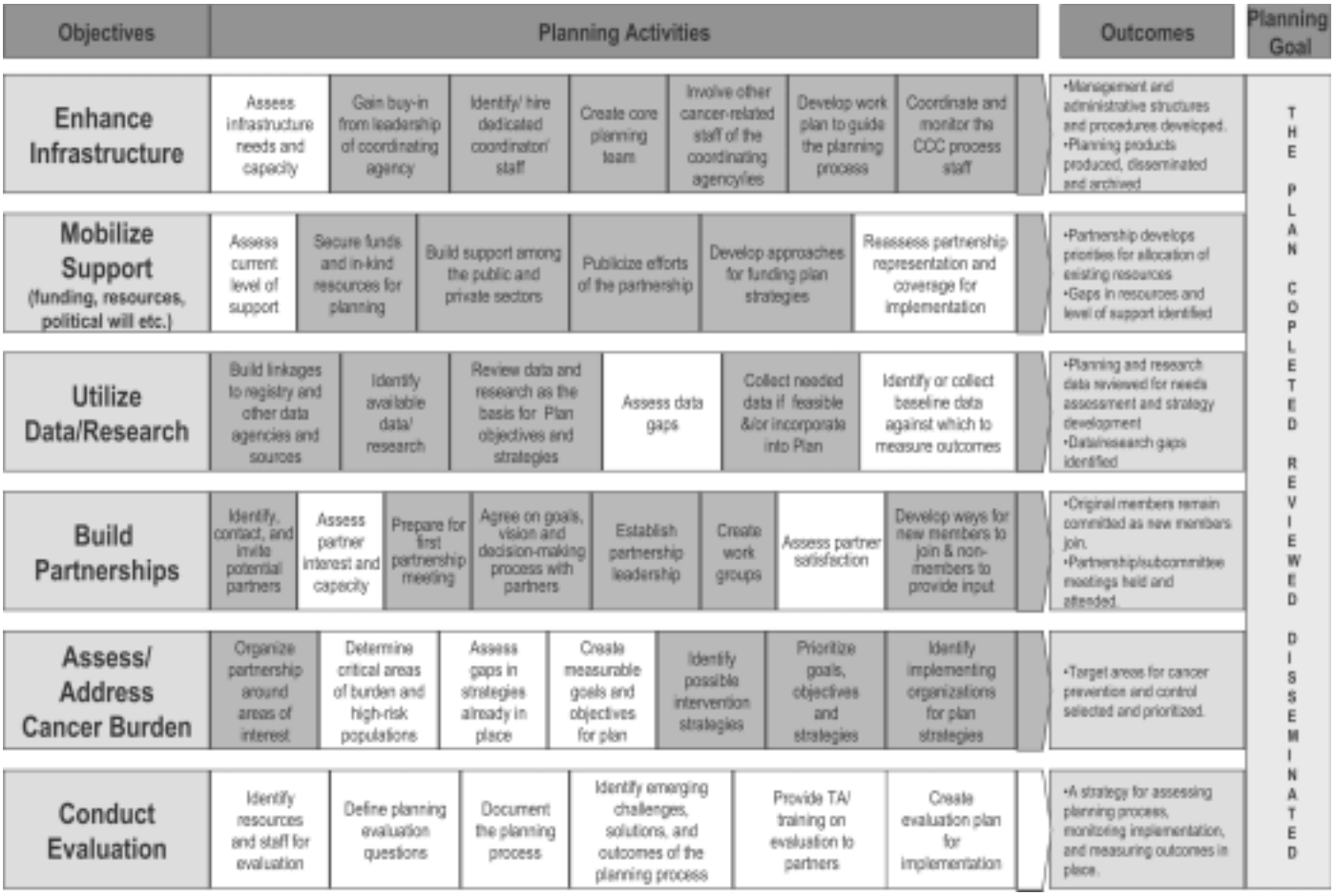
Infrastructure to Support Programs

Program Management and Administration

Building infrastructure is a critical activity in any comprehensive approach to cancer prevention and control. Such infrastructure, including staff, funding, and in-kind support from partners, must be adequate to support the implementation of program activities.

To build an effective infrastructure for a comprehensive cancer prevention and control

Figure 1: Building Blocks of Comprehensive Cancer Control Planning



program, the coordinating agency should provide at least a full-time coordinator and preferably several dedicated staff positions. Because of the importance of cancer data for identifying problems, evaluating programs, and making decisions, the core planning team for any comprehensive cancer control program should include cancer registry personnel as well as people with expertise in evaluation and epidemiology both from within and outside the health department.

Statewide Comprehensive Cancer Control Plans

Since 1997, CDC has evaluated state-specific approaches to comprehensive cancer prevention and control planning in a series of case studies and assessments. The results of these evaluations can be found in *Essential Elements for Developing/Expanding Comprehensive Cancer Control Programs* (www.cdc.gov/cancer/ncccp/elements/index.htm).

The case studies both illustrate barriers to fully implementing comprehensive approaches and provide examples of successful comprehensive programs. CDC's *Guidance for Cancer Control Planning* (www.cdc.gov/cancer/ncccp/index.htm) also suggests specific activities (called building blocks for comprehensive cancer control planning) to help public health agencies and their partners develop a comprehensive cancer control plan and establish a comprehensive cancer control program. These building blocks are presented graphically in Figure 1. Estimates of the time needed to complete the activities suggested in the building block model range up to 2 years.

A comprehensive cancer control plan that is thorough, integrated, and realistic will provide participating organizations with a detailed outline of

what each is doing and allow for better coordination of activities. Comprehensive cancer control plans should

- Include a population-based assessment of the cancer burden in the jurisdiction.
- Include short-term and long-term goals, measurable objectives, proposed strategies for reducing the cancer burden, and a plan for evaluating the effectiveness of proposed interventions.
- Be created with diverse partners, inside and outside the health department, who are committed to achieving the goals and objectives of the plan.
- Address cancer-related issues across a continuum of care, including those associated with primary prevention, early detection, treatment, rehabilitation, pain relief, and survivorship.

Surveillance and Evaluation

Using Data and Research

The commitment of participants in comprehensive cancer control planning will be substantially influenced by the quality of the data on which the planning is based.

Comprehensive Cancer Control Programs in Action—Kentucky: To define its priorities and select targets for intervention, the Kentucky Cancer Program administered a needs survey to cancer stakeholders throughout the state. It then used data from this survey and from a review of existing categorical plans and of *Healthy Kentuckians 2010* goals to develop a plan that contains 14 recommended actions and from one to four priority strategies for executing each of them. (www.cdc.gov/cancer/ncccp/contacts/ky.htm)

To evaluate their effectiveness, comprehensive cancer control programs need an established mechanism with which to identify and track cancer case data, including the extent of disease, the kinds of treatment patients receive, and patient outcomes (death or survival). Such mechanisms also allow them to monitor overall changes in disease and risk-factor rates as well as changes within specified geographic areas and populations.

Sources of data on cancer-related deaths, cancer incidence, and cancer screening include vital records; cancer registries; the Behavioral Risk Factor Surveillance System (BRFSS, www.cdc.gov/nccdphp/brfss); state cancer registries supported by CDC's National Program of Cancer Registries (NPCR, www.cdc.gov/cancer/npcr/register.htm); and cancer registries participating in NCI's Surveillance, Epidemiology, and End Results (SEER) program (www.seer.cancer.gov). Another data source is the CDC-funded National Breast and Cervical Cancer Early Detection Program (www.cdc.gov/cancer/nbccedp/index.htm), which maintains program records incorporating a set of standardized data elements, called minimum data elements or MDEs; these records provide consistent and complete service and outcome information on women screened by the program. Cancer control programs should also incorporate data collection activities into their own plans.

Comprehensive Cancer Control Programs in Action—Northwest Portland Area Indian Health Board: Although American Indian/Alaska Natives are generally thought to have disproportionately high cancer incidence and mortality rates, official rates tend to be underestimated because many health registries do not accurately code race. Using record linkages between the Northwest Tribal Registry and state health registries, the Northwest Tribal Registry showed that the true incidence of cancer among its tribal members was 267.5 per 100,000 population rather than 153.5 per 100,000 as previously reported. These more accurate data gave the board the factual support it needed in arguing for additional cancer control resources. (www.npaihb.org/cancer/ntccp.html)

Conducting Evaluation

Stakeholders should be involved in the entire evaluation process, including describing program processes and defining program activities and expected results. By collaborating to define specific activities and the results they should achieve, partners will have a common basis for understanding evaluation plans, activities, and results.

Evaluations should include both quantitative and qualitative measures and should address short-term, intermediate, and long-term outcomes. The planning group should build evaluation processes into the program itself rather than consider evaluation activities as separate from program activities and should identify resources necessary for evaluation early in the planning process. Some health agencies have in-house evaluation staff, while others obtain help from partners or through contracts with local colleges or universities. The Community Toolbox (www.ctb.lsi.ukans.edu) is another resource that can help health agencies monitor their comprehensive cancer prevention and control activities.

CDC recommends that comprehensive cancer control programs monitor the cancer-related indicators defined in *Indicators for Chronic Disease Surveillance: Consensus of CSTE, ASTCDPD, and CDC,* which is available at www.cste.org. These indicators provide a common set of measures for chronic disease surveillance that program planners can use to establish priorities and implement surveillance activities consistent with those in other jurisdictions.

Contained in this consensus document are surveillance indicators specific to cancer. These indicators include the incidence and rate of death attributable to the following types of cancer: lung, colon/rectum, female breast, prostate, cervix, bladder (in situ included), melanoma, and oral cavity/pharynx, as well as overall rates for all types combined. The document also includes indicators related to screening for colorectal, cervical, and female breast cancers. These indicators closely mirror several of the *Healthy People 2010* objectives.

Evaluation questions should be designed to identify those issues most pertinent to stakeholders. Care should be taken to select questions that can be readily answered with available evaluation resources. Examples of evaluation questions that can be asked at different stages in an evaluation process are shown in Table 2.

Partnerships

To create a fully comprehensive approach to cancer prevention and control, organizations must work synergistically with others involved with similar activities. Collaboration is key to a comprehensive effort.

In most of the examples presented in this section, health department staff serve as core members of comprehensive cancer control programs; however, the staffing pattern can vary, as can the "lead" responsibility for the program. Participating organizations can work semi-independently to implement plan activities as long as they keep the planning group (and thus other participating organizations) informed of what they are doing.

Comprehensive Cancer Control Programs in Action—Michigan: Comprehensive cancer control in Michigan is guided by the Michigan Cancer Consortium, an advisory body to the state health department and to all other cancer control players in the state. The consortium, which includes cancer experts and other representatives from more than 70 member organizations, provides leadership for decision-making and a forum to coordinate achievement of priority objectives in its comprehensive state plan. The representatives from these agencies are often in a position to influence cancer control policy within their own organization as well as within the consortium. (www.michigan.gov/documents/MCCIPlan_6718_7.pdf; www.michigan.gov/mdch/0,1607,7-132-2940_2955_2975-13561--,00.html#priorities)

Table 2. Sample Evaluation Questions for Comprehensive Cancer Control

Evaluation Level	Evaluation Questions
Process Evaluation of Program	• Is the comprehensive cancer control process working well? Are members satisfied with the process? Are planning tasks being accomplished and are planning products being produced in a timely manner?
Outcome Evaluation of Program	• Are the partnership's overarching goals and objectives being achieved? Is infrastructure for cancer control being enhanced? Is support for the initiative being mobilized? Are data and research being utilized? Are partnerships being built? Is the cancer burden being assessed? Addressed? Are the planning process and outcomes being evaluated?
Process Evaluation of Plan	• Are strategies proposed in the plan being implemented? Are knowledge gaps being addressed through surveillance and research? • Are interventions being delivered— To subpopulations with high risk and high burden? In a culturally appropriate manner? In a timely manner? In a cost effective manner? • Are implementation difficulties being successfully overcome?
Outcome Evaluation of Plan	• Are the outcomes anticipated by the partnership for each strategy being achieved? Has the baseline problem status identified by partners improved? Have intermediate measures of behavior such as cancer screening rates or rates of various risk behaviors changed? Over time, has cancer incidence, morbidity, and mortality from cancer decreased? Over time, have health disparities related to cancer among subpopulations decreased?

Source: Adapted from CDC's *Guidance for Comprehensive Cancer Control Planning.* (Avalable at www.cdc.gov/cancer/ncccp/index.htm.)

Early in the planning process, health departments should identify and solicit the help of partners able to support their efforts. Possible partners include

- Representatives of organizations likely to implement plan strategies.
- Legislators who can provide political and legislative support.
- Representatives of priority populations who can suggest health-promoting strategies and interventions appropriate for those populations.
- Representatives of organizations that may be able to fund activities or that will be doing similar activities under other sponsorship.

To reach specific priority populations, cancer control programs should also seek community partners who can help them create culturally sensitive messages and programs.

Comprehensive Cancer Control Programs in Action—West Virginia: As an initial step in the planning process to establish a comprehensive cancer control program in West Virginia, representatives of four founding organizations (the West Virginia Breast and Cervical Cancer Screening Program, the Office of Epidemiology and Health Promotion in the West Virginia Bureau of Public Health, The American Cancer Society's Mid-Atlantic Division, and the Mary Babb Randolph Cancer Center of West Virginia University) began efforts to promote the concept of comprehensive cancer control and to generate interest from a diverse group of potential coalition stakeholders. Now, more than 120 individuals and organizations make up the membership of Mountains of Hope, the state's comprehensive cancer control coalition. (www.cdc.gov/cancer/ncccp/contacts/wv.htm)

As comprehensive cancer control projects move from the planning stage to the implementation stage, what might have begun as a loose network of organizations and individuals should be forged into a fully functioning collaborative capable of significant advocacy, coordination, and action. To ensure the continued involvement of committed partners, project leaders should work to identify and recruit new partners, involve partners in decision-making processes and planning activities, and regularly assess the satisfaction and commitment of partners.

Samples of state-developed tools, including a planning meeting invitation letter and registration form, a partner interest survey and commitment form, a partner questionnaire, and a proposed process for creating a comprehensive cancer control plan can be found in CDC's *Guidance for Comprehensive Cancer Control Planning* (www.cdc.gov/cancer/ncccp/index.htm).

Comprehensive Cancer Control Programs in Action—Colorado: In June 2001, Colorado launched a public education campaign that included a special brochure, "Sun Smart Tips." The goal of this campaign was to educate visitors to Colorado's state and national parks about the need to protect themselves from the damaging rays of the sun. This campaign resulted from a unique partnership among national park officials and the state health department. Working together, Colorado's Comprehensive Cancer Prevention and Control Program, the Mesa Verde National Park, and park concessioners educated Colorado residents, as well as visitors from all over the world, about the easy steps they can take to prevent skin cancer. (www.cdphe.state.co.us/pp/ccpc/CancerPlan.pdf)

Communications

A solid health communications strategy is essential to successful interventions. For comprehensive cancer control, this strategy should entail an integrated and coordinated approach to educating the public, government leaders, health care providers, and others about cancer and its risk factors and how best to prevent, detect, and treat the disease. Health

communication strategies should be coordinated as much as possible with other program initiatives such as improving health care service delivery and creating supportive public policies.

Because everyone is at risk for cancer, cancer messages are needed for all population groups. However, each message should be tailored for a specific, targeted audience (e.g., people with a certain form of cancer, members of a specific racial or ethnic group, members of professional and health organizations). Messages should be accurate, use consistent terminology, and describe what people can do to help reduce their risk for cancer, detect it in its early stages, and obtain appropriate treatment if cancer is diagnosed.

Health communication activities should be part of a larger plan to address factors affecting behavior (e.g., social norms, governmental policies). In developing their communication plan, states should

- Identify and define the health problem they want to address.
- Incorporate an evaluation component into the communication plan.
- Be culturally sensitive in developing strategies and messages, conducting research, and implementing and evaluating communication efforts.
- Ensure that the targeted audience receives a single, simple, specific, and consistent message.
- Conduct qualitative and quantitative audience research to help understand how the audience perceives concepts and to determine their willingness and ability to do what is being asked. In addition to conducting formative research and pre-testing concepts and messages, health communicators should monitor the effectiveness of the communication campaign itself.
- Examine the wide range of actual and perceived barriers to and incentives for healthy (and unhealthy) behaviors and address them. Social marketing provides a useful framework for thinking about how to make behavior change easier.

Members of partner organizations often participate in important work groups. Following are three examples of how work groups have contributed to state cancer control efforts:

Comprehensive Cancer Control Programs in Action—Arkansas: In Arkansas, work groups were organized around the structure of the state cancer control plan. Three separate groups each developed a chapter for the plan: these chapters included an introduction on cancer in the state, a background section containing in-depth statistics, and a chapter on strategic options. Other work groups included an implementation team (which will become more active as the plan is finished), an evaluation team, and a communication team. (www.healthyarkansas.com/disease/cancerplan.pdf)

Comprehensive Cancer Control Programs in Action—Kansas: In Kansas, cancer site-specific work groups developed priorities for breast, cervical, skin, colorectal, prostate, and lung cancers. In addition, two crosscutting work groups developed priorities in the areas of cross-cultural competency and rehabilitation and pain. (www.cdc.gov/cancer/ncccp/contacts/ks.htm)

Comprehensive Cancer Control Programs in Action—Maine: Maine provided its work group members with both surveillance data and research literature to help them develop evidence-based goals, objectives, and strategies for the state's comprehensive cancer control plan. At least one member organization of the work group had to commit to a goal and its related objectives before the goal could become part of the plan. The Maine plan contains 18 goals and about 100 related objectives, each with multiple related strategies, and each with an organization accepting responsibility for its implementation. (www.cdc.gov/cancer/ncccp/contacts/me.htm)

- Devise health communication messages capable of competing effectively against possibly conflicting "unhealthy" messages that people may receive from other sources, including advertisers, the music and entertainment industry, and family and friends.

Professional Development, Training, and Technical Assistance

Comprehensive cancer prevention and control requires public health workers and health care providers to develop skills such as strategic planning and partnership building not usually considered necessary for their professions. To help them develop these skills, CDC offers professional development training for each group. For example, to help public health workers develop the skills necessary to lead comprehensive cancer control efforts, CDC has partnered with various other organizations to create "Working Together for Comprehensive Cancer Control: An Institute for State Leaders," a 2-day program attended by teams of 5 to 10 leaders from multiple states. The program includes presentations in various areas related to comprehensive cancer control and gives participants a chance to share their experiences with participants from other states as well as engage in team-specific assessment, feedback, and planning activities. Each session is tailored to the specific needs of the participants. The goal of the institute is for participants to implement a strategic action plan within the following year that will further the implementation of comprehensive cancer control.

CDC has also developed several resources to help health care providers prevent, detect, and treat cancer in their patients. These include

- *A Call to Action: Prevention and Early Detection of Colorectal Cancer.* This training program for primary care providers is available at www.cdc.gov/cancer/colorctl/calltoaction/index.htm.
- *Guidance for Breast Cancer Screening Follow-Up.* This resource, a self-study packet which includes a videotape, is designed to help clinicians, particularly those in rural areas, provide better follow-up care or referrals for women who have abnormal breast cancer screening results. (The packet is expected to be available in 2003.)

Funding

At a minimum, a comprehensive cancer prevention and control program needs sufficient funds to support a core infrastructure for planning activities. This core infrastructure should include

- At least one full-time staff person.
- Adequate facilities, equipment, supplies, and support (especially computer support).
- Capacity to conduct data analysis.
- Sufficient funds to support travel throughout the state.
- Sufficient funds to hold regular partnership meetings.
- Sufficient funds to plan, print, and distribute the comprehensive cancer control plan.

Comprehensive Cancer Control Programs in Action—Michigan: As of 2001, the Michigan Cancer Consortium (MCC) had 14 full-time employees from the state health agency working on the statewide Comprehensive Cancer Initiative. In 1998, the state provided approximately $1.3 million to support the initiative. In 1998, MCC volunteers and their employers donated 460 hours during the planning process. In 2001 (year 3 of implementation), MCC volunteers and their organizations reported contributing more than 730,000 hours toward the achievement of the 10 MCC priorities and $27 million in staff and other resources. (www.michigan.gov/documents/MCCIPlan_6718_7.pdf; www.michigan.gov/mdch/0,1607,7-132-2940_2955_2975-13561--,00.html#priorities)

CDC estimates that states will need at least $150,000 per year (or its equivalent in a combination of cash and donated services) to

establish this planning infrastructure. In addition, states should anticipate higher infrastructure costs as they incorporate specific cancer areas (e.g., breast, cervical, prostate, colorectal, or skin cancers) or cancer issues (e.g., pain management, data deficits) into their comprehensive cancer control approach.

Comprehensive Cancer Control Programs in Action—Georgia: Georgia used money from the 1998 tobacco settlement and other sources to fund the creation of a nationally recognized strategic plan for the Georgia Cancer Coalition (GCC). State support for the GCC is expected to total several hundred million dollars over the next 5 to 7 years. The governor has issued a challenge to stakeholders to leverage this amount threefold, resulting in a total investment of $1 billion. The GCC will employ a small staff to coordinate GCC initiatives and monitor their progress. It will also continue to solicit funds to support the work of partnering hospitals, nonprofit organizations, and educational institutions, as well as various research initiatives. (www.ph.dhr.state.ga.us/programs/cancer/index.shtm)

The actual implementation of a comprehensive cancer control plan involves even more complicated funding variables, and total costs depend on the extent to which site-specific or risk-factor-specific interventions are included and on the type of interventions used. For example, a media campaign is much more costly than in-service training for health care providers. CDC estimates that the cost of implementing a comprehensive approach to cancer prevention and control ranges from $250,000 to $1,000,000 per year.

The cost of a cancer screening program is a function of the cost of the services provided and the number of people screened. Typical annual costs for breast and cervical cancer screening range from $200,000–$300,000 for small programs that screen 1,000 women annually to $3.5–$6 million for larger programs that screen 18,000–25,000 women annually. The cost of a cancer registry program typically ranges from $13–$150 per case identified.

National Leadership

CDC's Division of Cancer Prevention and Control (DCPC) is a leader in nationwide cancer prevention and control and works with national organizations, state health agencies, and other key stakeholders to develop, implement, and promote effective cancer prevention and control practices. DCPC supports seven initiatives:

- National Comprehensive Cancer Control Program
- National Breast and Cervical Cancer Early Detection Program
- National Program of Cancer Registries
- Colorectal Cancer Prevention and Control Initiatives
- Prostate Cancer Control Initiatives
- Skin Cancer Primary Prevention Education Initiatives
- Ovarian Cancer Control Initiative

More information about these programs and initiatives is available at www.cdc.gov/cancer.

In 2000, DCPC began work with the National Dialogue on Cancer (www.ndoc.org) and partner organizations such as the American Cancer Society (www.cancer.org), the National Cancer Institute (www.nci.nih.gov), and the National Governor's Association (www.nga.org) to accelerate the development and implementation of comprehensive cancer control plans at the state, tribal, and territory level. These plans are to be based on research data and stakeholder input and must establish clear lines of responsibility and accountability. DCPC's goal is for all states to produce comprehensive cancer control plans by 2005.

National Partnerships

DCPC partners with other entities within CDC, with other governmental agencies such as NCI, with private nonprofit organizations such as the American

Cancer Society (ACS), and with public health organizations such as the Chronic Disease Directors (www.chronicdisease.org).

CDC's Office on Smoking and Health (www.cdc.gov/tobacco), its Division of Nutrition and Physical Activity (www.cdc.gov/nccdphp/dnpa), its Division of Adolescent and School Health (www.cdc.gov/nccdphp/dash), and many other CDC centers, institutes, and offices conduct work relevant to cancer control. For example, the mission of CDC's National Center for Environmental Health (www.cdc.gov/nceh/default.htm) is to prevent illness, disability, and death from interactions between people and the environment by conducting research to investigate the effects of the environment on health. CDC's National Institute for Occupational Safety and Health (www.cdc.gov/niosh/homepage.html) conducts research and makes recommendations aimed at preventing work-related illnesses and injuries.

NCI provides cancer information through publications, reports, and its toll-free Cancer Information Service (1-800-4-CANCER). NCI also provides grant funds, supports training programs for health professionals, and partners with other academic and national organizations on projects related to cancer prevention and control.

The American Cancer Society is a nationwide community-based voluntary health organization dedicated to eliminating cancer as a major health problem by preventing cancer, saving lives, and diminishing suffering from cancer through research, education, advocacy, and service. It includes chartered divisions throughout the country and over 3,400 local units.

Technical Resources

Several national public health organizations offer training and technical assistance in cancer surveillance, research, and intervention. The Web sites of NCI (www.nci.nih.gov) and ACS (www.cancer.org) are particularly good sources of information and materials on various forms of cancer and related issues.

Other CDC cancer-related resources include

- A cancer-related Web site (www.cdc.gov/cancer).
- E-mail service for public inquiries (cancerinfo@cdc.gov).
- Numerous cancer-related publications and materials that can be accessed at www.cdc.gov/cancer/publica.htm.

In addition, resources specific to comprehensive cancer control can be located at www.cdc.gov/cancer/ncccp. They include the following:

- Journal articles that provide a conceptual foundation for comprehensive cancer control.
- A guidance document and toolkit on comprehensive cancer control planning.
- A report outlining essential elements for developing comprehensive cancer control programs.
- A network of state and tribal comprehensive cancer control contacts.
- A toll-free telephone number (1-888-842-6355) for additional information.

Progress to Date and Challenges Ahead

Building scientific and programmatic capacity in state, territorial, and tribal health agencies to provide a foundation for future cancer prevention and control efforts is an ongoing challenge. CDC strives to meet this challenge by providing resources and support to public health agencies through programs such as the National Breast and Cervical Cancer Early Detection Program, which is in its 12th year.

CDC recently released a consolidated program announcement that included funding for additional comprehensive cancer control programs. This funding mechanism, which consolidated the National Comprehensive Cancer Control Program (NCCCP), the National Program of Cancer Registries, and the National Breast and Cervical Cancer Early Detection Program, is a first step toward integrating support for cancer-related programs.

As of November 2002, CDC supported 27 states and 1 tribal organization in their efforts to create or implement comprehensive cancer control plans and programs through the NCCCP. A key challenge in the future will be to evaluate the impact of these programs and the value-added benefits of a comprehensive approach to cancer prevention and control. CDC will continue to address this and other challenges by

- Expanding national partnership activities.
- Conducting research to determine how best to implement comprehensive cancer control plans and programs.
- Providing ongoing technical assistance.
- Addressing implementation challenges by providing training and resources to leaders of comprehensive cancer control programs.
- Evaluating the impact of comprehensive cancer control efforts.
- Expanding the NCCCP to include more states, territories, and tribes, as funding allows.

Enhancing surveillance systems to help strengthen the foundation upon which cancer prevention and control activities are based is a priority. In November 2002, CDC released *United States Cancer Statistics: 1999 Incidence* (available at www.cdc.gov/cancer/npcr). This report, a joint publication of CDC and NCI in collaboration with the North American Association of Central Cancer Registries, contains the first set of official cancer incidence statistics from states that meet high-quality data standards. Two federal programs support population-based cancer registries in the United States: CDC's National Program of Cancer Registries and NCI's Surveillance, Epidemiology, and End Results (SEER) Program. The report contains statistics on more than 1 million invasive cancer cases diagnosed during 1999 in residents of 37 states, 6 metropolitan areas, and the District of Columbia—geographic areas in which approximately 78% of the U.S. population resides. Using these data to further plan, develop, and evaluate comprehensive cancer programs is both an opportunity and a challenge for state, territorial, tribal and local health departments and their partners, including CDC.

The ultimate goal of comprehensive cancer control is to serve the public more effectively and more efficiently by coordinating all cancer control efforts. To achieve this goal, public health leaders must accept the opportunity and the responsibility to address cancer prevention and control from a broader perspective. CDC will continue to work with state, tribal, and territory leaders and national organizations to make programs available in every state to address death and disability from cancer and its principle risk factors.

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